MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018 SESSION

TDA2411 – DIGITAL AUDIO AND SPEECH PROGRAMMING

(All sections / Groups)

9 March 2018
9 AM – 11 AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 2 pages with 4 Questions only.

2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the answer booklet provided.

Question 1

a) Describe the THREE different ways in which a speech signal can be represented. Give an example for each of the speech representation methods.

[3 marks]

b) In order to perform speech processing on a speech signal, features need to be extracted from the signal. List any THREE features that are normally used for speech processing.

[1.5 marks]

c) What is the sampling frequency of a waveform if the sampling period is 40ms?

[2 marks]

d) What is Csound? Explain the functions of the Csound's orchestra file and score file.

[1.5 marks]

e) Contrast between phonetic and prosodic features of speech.

[2 marks]

Question 2

a) Explain the THREE main types of speech synthesis techniques.

[3 marks]

b) The reliability of a speech recognizer is most often defined by its recognition accuracy. Describe the THREE types of speech recognition errors that can decrease recognition accuracy.

[3 marks]

c) List the THREE types of MIDI port and explain the function of each.

[1.5 marks]

d) Define quantization and quantization error. Briefly describe how the choice of bit depth value affects quantization error.

[2.5 marks]

Continued...

Question 3

a) Draw the basic building block for formant synthesis.

[3 marks]

b) What does the utterance processor 'TokenToWords' perform in FreeTTS? Given the input as "The price was $1.5million." as the input, provide the output of the 'TokenToWords' utterance processor.

[3 marks]

c) Explain how flanging effect is achieved in performing digital audio effect? Define 'depth' in the context of flanging effect.

[2 marks]

d) Define morpheme in speech processing context. Write the morphemes for each of the following words:

[2 marks]

i. Somebody

ii. Unthinkable

iii. References

Question 4

a) What does Nyquist Theorem specify and what is Nyquist frequency?

[2 marks]

b) If an audio is sampled at 6 kHz, calculate the aliasing frequency if the input signal has a frequency of:

[2 marks]

i. 3 kHz
ii. 8 kHz

c) Define 'grammar' in speech recognition context and explain why it is necessary.

[2 marks]

d) Ring modulation is one of the frequency-changing effects that can be applied to audio signals. Explain how ring modulation is performed by showing the input and output of the method using a diagram.

[4 marks]

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